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CONSTRUCTION AND ADMINISTRATION OF EXPERIMENTAL MEDICAL AND CHE--ETC(U)  
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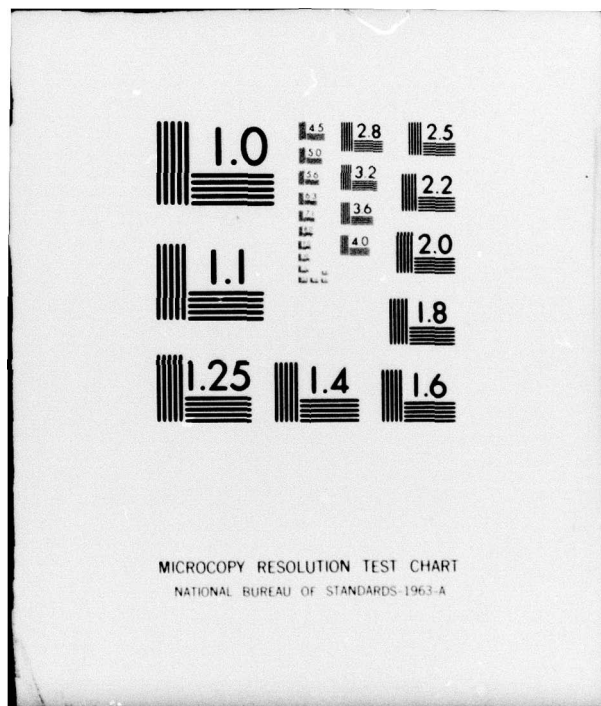
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6 CONSTRUCTION AND ADMINISTRATION OF EXPERIMENTAL MEDICAL  
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## CONSTRUCTION AND ADMINISTRATION OF EXPERIMENTAL MEDICAL AND CHEMICAL INFORMATION ITEMS FOR THE ACB

### BACKGROUND

Research to maintain and improve tests in the Army Classification Battery (ACB) includes the development of information items that measure aptitudes required for medical and chemical MOS. Assignment to medical MOS is based on scores obtained in the General Technical (GT) Aptitude Area, and assignment to chemical MOS is based on scores obtained in the General Maintenance (GM) Aptitude Area. GT is composed of two measures (Verbal and Arithmetic Reasoning) which are highly loaded in general intellectual ability. GM is composed of a general intelligence measure (Pattern Analysis) and a broad mechanical measure (Shop Mechanics). The latter is scheduled to be replaced by a more specific measure related to particular mechanical specialities. New test content (items measuring medical and chemical information) is required to improve differential classification in these aptitude areas.

The present research memorandum describes the completed phases of research to develop medical and chemical information items: (1) preparation of a pool of experimental medical and chemical information items; (2) organization of the items into four experimental forms; (3) development of experimental keys to facilitate analysis and test refinement, and (4) administration of the experimental forms to appropriate samples. The final phase, including item analysis and test refinement, will be covered in a subsequent report.

### PREPARATION OF ITEM POOL

A pool of approximately 350 items was prepared. Most of the items were constructed by HFRB psychologists, using pertinent texts: Modern Health by Otto, J. T., 1955; Building Health, Tippincott, W., 1950; Health and Safety for You, Diehl, H. S. and Laton, S. D., 1952; and Army Manuals TM 3-205, TM 3-215, TM 3-216, TM 8-227 and TM 8-233. The remaining items were adapted from civilian tests: Cooperative High School Biology Test, Forms X and Y, 1933-51; Iowa High School Content Examinations; Iowa Bureau of Educational Research 1925, 1943; McDougal General Science Test, Bureau of Educational Measurement, Kansas Teachers College, 1941; Cooperative General Achievement Test, Revised Series, 1940-51; Presson Biology Tests, 1930; Regents Scholarship Exams, 1944 Series; and Iowa Tests of Educational Development, 1942. An anatomy diagram was adapted from Modern Health, Plate IV, pp. 406-407.

Two general categories of item content were included in the item pool: (1) general biological or medical items and (2) general chemistry or laboratory items. The number of items for each category was determined by considering the relative proportions of annual replacement requirements

for EM in each of the following medical and chemical MOS: the 91 series, Medical Care and Treatment; the 93 series, Medical Laboratory; the 53 series, Chemical; the 57 series, Fuel and Industrial Gas Productions; and MOS 904, Chemical Laboratory Specialist.

Specific item content was determined by analyses of job descriptions, job schedules, and programs of instruction covering these MOS groups. Items were proportioned according to the emphasis placed on the subject matter in the training programs. Main emphasis across all training programs was placed on general anatomy, first aid, preventive medicine, and practical applications of chemistry.

#### ORGANIZATION OF ITEMS IN EXPERIMENTAL FORMS

After a preliminary tryout on 15 civilian subjects with varying degrees of background knowledge, the items were revised and organized into three Bio-Chem experimental forms (BC-1X, PT 3952; BC-1Y, PT 3953; and BC-1Z, PT 3831), each containing 103 items. Classification of the items by source is shown in Table 1, and by content in Table 2. The three forms are highly comparable in content. They differ, however, in the format used for identification-type items. In Form BC-1X pictorial sets are given, and location of named parts is required. Form BC-1Y also contains pictorial sets but requires the location of unnamed parts that are described by function. Form BC-1Z presents non-pictorial items paralleling the content of the identification items in the other forms.

An additional experimental form, the Chemistry Information Test (PT 3989) composed of 50 items, was prepared. Items in this form are of a relatively low level of difficulty, according to results on the preliminary administration. They cover general knowledge and practical applications in the chemistry area. The form was designed for administration to trainees for entry MOS 530, Chemical Warfare Helper.

#### DEVELOPMENT OF EXPERIMENTAL SUBTEST KEYS

Eight a priori judgment subtest keys, covering specific content areas, were developed to measure underlying factors considered necessary for, or relevant to, specific MOS duties. Five keys were developed for the medical MOS, and three keys for the chemical or laboratory MOS (Table 3). In order to study the relation of work attitudes and preferences to information and job performance, consideration was given not only to the type of knowledge useful for success on the job but also to the types of activities encountered and interactions required in the work situation.



Table 1

## SOURCES FOR CONTENT OF ITEMS IN BIO-CHEM EXPERIMENTAL FORMS

Source	Number of Items		
	BC-1X	BC-1Y	BC-1Z
Cooperative Biology Test--H.S., 1933-51, Forms X and Y	3	3	2
Iowa H.S. Content Exams; Iowa Bur. of Ed. Res. 1925, 1943	1	4	3
McDougal General Science Test; Bur. of Ed. Meas., Kansas Teachers College, 1941	8	5	6
Cooperative General Achievement Test, Revised Series, 1940-51	11	12	10
Presson Biology Tests, 1930	5	4	2
Regents Scholarship Exam. 1944 Series	2	5	5
Iowa Tests of Ed. Develop., 1942	4	1	2
New items, based on civilian texts	58	59	60
New items, based on Army manuals	<u>11</u>	<u>10</u>	<u>13</u>
	103	103	103

Table 2

## ITEMS IN BIO-CHEM EXPERIMENTAL FORMS CLASSIFIED BY CONTENT

Content	Number of Items		
	BC-1X	BC-1Y	BC-1Z
<u>General biology or medical</u>			
First aid	9	9	9
Preventive medicine	10	10	7
Lower forms	4	5	5
Nutrition	7	7	6
Circulation	6	6	6
Muscles	2	2	2
Glands	4	4	4
Eye and ear	4	4	4
Anatomy-physiology	15	16	16
Bacteria	4	4	3
Reproduction	2	2	2
General knowledge	<u>3</u>	<u>2</u>	<u>5</u>
Total	70	71	69
<u>General chemistry or laboratory</u>			
Organic chemistry	2	2	2
Laboratory devices	4	4	4
Experiments	5	5	5
Analysis	3	3	2
Bases and acids	1	1	1
Practical application	11	10	10
Heat and pressure	3	4	3
General knowledge	<u>4</u>	<u>3</u>	<u>7</u>
Total	33	32	34
Grand Total	103	103	103



Table 3

## EXPERIMENTAL KEYS FOR BIO-CHEM EXPERIMENTAL FORMS

Keys	Number of Items		
	BC-1X	BC-1Y	BC-1Z
<u>Medical MOS</u>			
Action	16	14	16
Understanding anatomy	14	14	14
Understanding physiology	14	13	13
Layman understanding	12	15	12
Theoretical understanding	14	15	14
<u>Chem or Lab MOS</u>			
Laboratory	15	13	14
Applied knowledge	8	10	11
Layman understanding	10	9	9
	<hr/> 103	<hr/> 103	<hr/> 103

## FIELD ADMINISTRATION AND ANALYSIS

The experimental forms were administered during October 1960 to three samples: (1) 600 recruits processed at the Reception Station, Fort Knox, Kentucky; (2) 650 trainees at the Army Medical Training Center and Service School, Fort Sam Houston, Texas; (3) 170 trainees at the U. S. Chemical Corps School, Fort McClellan, Alabama. Approximately one-third of each sample took Form BC-1X; another third took Form BC-1Y, and the remainder took Form BC-1Z. The forms were administered according to procedures outlined in the Manual, Administering the Bio-Chem Information Text (PT 3955). A standard answer sheet, PT 3104, was used for each form.

Final forms will be developed on the basis of item analyses and analyses of keys in the experimental forms. The items will be analyzed in relationship to the experimental keys, to expressed interest on the Army Jobs Activities Questionnaire (PT 3986, prepared under New Classification Techniques project a-34), and to MOS performance in order to obtain the best predictive instruments for groups of related MOS. Item selection will be guided by item p-values and item correlations. In the recruit sample, item correlations with selected ACB tests will be obtained. In the two trainee samples, item correlations with criteria of school and on-the-job performance will be obtained.